

AGRO-INDUSTRY AND SMALLHOLDER AGRICULTURE: INSTITUTIONAL ARRANGEMENTS AND RURAL POVERTY REDUCTION IN MOZAMBIQUE**Rui Benfica, David Tschirley and Liria Sambo**

INTRODUCTION: Agro-industry - adding value to agricultural commodities through processing before they reach consumers - can play a key role in agricultural development, especially if it is located in rural areas. In developing countries, agro-industrialization is increasingly driven by globalization, as manifested by foreign direct investment and trade (Reardon and Barrett, 2000) - Mozambique is not an exception. Some of the characteristics of this process, especially much more stringent standards for quality and food safety, may work to exclude many small farmers. Whether this happens, or whether the smallholder sector instead benefits widely from the process, depends on the type of agro-industrial investment taking place, and on the ability of government and the broader "development community" to assist these farmers to overcome the organizational and technical barriers to their beneficial participation.

Rural agro-industrial development has a very high potential to help reducing rural poverty levels (Jaffee and Morton, 1995; Dorward *et al.* 1998; Delgado, 1999). The effects of particular agro-industries in a given region, however, can vary depending on how closely related they are to the rural poor, and, more specifically, the set of factors that condition that relationship, ranging from crop specific characteristics to the economic and political environment. Research efforts towards a better understanding of those relationships and the potential direct and indirect impacts on rural poverty to inform policy decisions are, therefore, very relevant.

This *flash* deals with the issue of alternative organizational forms in the interaction between agro-

industrial investments and the smallholder agricultural sector in the food/fiber supply chain in rural areas of Mozambique, and makes a preliminary analysis on links to poverty reduction, and the role of policy in strengthening those effects. This issue is increasingly important, particularly for policy makers, private sector and NGOs engaged in promoting rural agro-industry in rural areas where poverty is more accentuated.

It draws on a reconnaissance study undertaken in Mozambique in 2001¹.

TRENDS AND PATTERNS IN AGRO-INDUSTRIAL INVESTMENT IN MOZAMBIQUE: Since the signature of the peace accord in 1992 and the subsequent first democratic elections in the country in 1994, there has been a significant inflow of capital to support investments in Mozambique. There are some general and sub-sector specific patterns. First, the value of agro-industrial investments represented, on average, almost 60% of all investments in rural based projects in the period 1985-mid 2001. Second, the total value invested in agro-industry increased about 5 times from the period 1985-1990 to 1991-1996, from \$33.4 million to over \$161 million. Then it more than doubled from that period to 1997-2001. Third, over the entire period, the focus of investment has moved from cotton and tobacco (1985-1990) to a more balanced diversification of investments in sectors like maize, cotton, and cashew in the first half of the 1990's. More recently, since the late 1990s (1997-2001),

* The opinions expressed here are the entire responsibility of the authors and do not reflect the official position of the Ministry of Agriculture and Rural Development.

¹ For a version of the full paper, see MADER/MSU Research Report #51E *The Impact of Alternative Agro-Industrial Investments on Rural Poverty Reduction in Mozambique* by R. Benfica, D.Tschirley and L.Sambo, (2002). Downloadable at <http://www.aec.msu.edu/agecon/fs2/mozambique/wps51e.pdf>

there's been significant investments in the sugar sector, and some in tea as well. Finally, there has been a recent emergence of investments by several tobacco companies in contract farming and processing operations in the center/north of the country, accompanied by a large increase in production.

RELATIONSHIP BETWEEN AGRO-INDUSTRY AND SMALLHOLDERS: Current agro-industrial investments in the country demonstrate various degrees of connectedness with rural households. Those forms were summarized in this study in three different types: Buying from independent producers (IP); contract farming (CF), and plantation agriculture (PA). Predominant sub-sectors identified in each type of arrangement were: IP (cashew, maize and the mango sub-sector); CF (cotton, and tobacco growing areas); and PA (sugar, tea, coconut, and citrus sub-sectors).

Between 1985 and mid-2001, about 45% of the total value invested went to agro-industries dealing with IP, 32% for PA schemes and 23% for CF schemes. For the same period, on average investments by agro-industries were \$3.8 million under IP arrangements, \$6.2 million under CF, and \$8.8 million under PA. Investments in processing projects are predominantly geographically located as follows: Maize (Maputo, Nampula and Sofala), Sugar (Maputo and Sofala), Cotton (Nampula, Zambezia, and Cabo Delgado), Cashew (Nampula, Gaza/Inhambane and Maputo), and Tea (Zambezia).

AN ANALYSIS OF ALTERNATIVE ARRANGEMENTS: Transaction costs economics, applied to the maize, cashew, cotton and sugar sub-sectors, was found to be helpful in predicting and explaining the predominance of particular organizational forms for these crops. This approach was also used to anticipate problems and strengths that may be associated with alternative organizational forms for the crops, and in identifying policy interventions to promote them in a sustainable way.

Theoretically Feasible, Observed and Suggested Arrangements. Table 1 synthesizes the theoretically feasible, the observed and the suggested institutional arrangements for selected sub-sectors in Mozambique. This section summarizes the analysis for those sub-

sectors. MADER/MSU Research Report #51E, presents a detailed sub-sector specific analysis based on a full set of *transaction cost factors*.

Table 1. Organizational Forms in Selected Sub-sectors

Organizational Forms	Sub-sectors			
	Maize	Cashew	Cotton	Sugar
Theoretically Feasible	IP	IP	CF	PA
Primarily Observed	IP	IP	CF	PA
Other Observed	PA	none	IP	IP
Investor Suggested	CF	CF/P A	IP/P A	CF

Legend: IP=Processing with independent smallholder producers; CF=Processing with contract farming; PA=Processing with plantation agriculture.

Maize Sub-sector . This is a key staple crop in the country. It is widely produced by rural households and consumed in both rural and urban areas. Production is predominantly by independent smallholder farmers using very simple production technology. It is essentially a labor using technology, with no significant economies of scale and without widespread use of chemical inputs that can, however, be increasingly used without the complex management typically required on high value crops. These production characteristics do not call for strong vertical coordination and drive the sub-sector towards independent production by smallholder farmers (IP). Furthermore, the fact that processors have to compete with many other buyers for a crop that can be traded domestically or exported without prior processing, increases dramatically the risk of default in contract farming (CF) schemes. Also, alternative forms of processing - local hammer mills and home hand pounding - create a highly dispersed domestic market for final sale, which also makes CF highly problematical due to credit default. Contract farming schemes are further disfavored because of problems of contract enforcement due to a weak legal system in rural areas, increased costs of coordination especially for the monitoring of credit recovery and the delivery

of extension assistance due to poor communications. This is all aggravated by low literacy among farmers that makes extension delivery for the dissemination of improved technologies particularly costly. In reality, we observe the predominance of spot marketing arrangements, though some investors are increasingly suggesting CF as a feasible alternative to overcome current problems. While appearing to deal with some issues, CF arrangements for this crop have a number of adverse factors.

Cashew Sub-sector. A key insight from this analysis is the critical importance to observed organizational forms (entirely IP) of the ability to export the raw cashew nut. This ability is driven by two factors. First, the very high value/weight ratio of the raw nuts means that transport costs have less impact on the final price received. Second, the close proximity of India further reduces transport costs, and the high installed processing capacity and very low wage rates in that country create incentives to pay more competitive prices for the raw nut, especially early in Mozambique's harvest season when nuts from India have not yet reached the processing plants. Ethnic ties between Mozambican traders and Indian buyers may also decrease the transaction costs of this trade. The result is that processors must compete with many potential local buyers for the raw nut, which substantially increases the risk to them of promoting production through contract farming arrangements. This analysis is especially pertinent in light of the ongoing controversy surrounding the GOM policy of charging excise taxes on the export of raw nuts. In fact, Parliament was unsuccessfully pressured to ban raw nut exports. While such a step would seem to address a key factor we identify here as impeding the emergence of contract farming arrangements, it does not follow that such arrangements would automatically emerge if raw nut exports were banned.

Cotton Sub-sector. This crop is generally grown in areas where cotton processing investments are installed. The dependence on quality raw materials for processing that highly depend on the use of chemical inputs in a country that has high degree of market failure in both input and credit markets creates the need for some vertical coordination. Full vertical integration is not attractive because of the nature of the crop characterized by high labor intensity in production that significantly increases the supervision costs in a plantation context, and the lack of economies

of scale in production. Dispersed production is possible due to the relatively high value-weight ratio which reduces the impact of transport costs. The need for processing before final sale results in a limited number of buyers that makes CF feasible. The organizational form that is predominantly observed is effectively contract farming. Some IP cases are also present. Although not strongly, some investors suggest IP and PA arrangements, but the analysis shows that without significant structural changes, neither is likely to be a feasible solution.

Sugar Sub-sector. This sub-sector requires high investment in agricultural equipment, especially irrigation, and use of large amounts of land in areas with abundant water resources and rail facilities. This makes dispersed production difficult. Moreover, needed economies of scale in production to assure scale compatibility with the processing stage, and the low value/weight ratio that makes transportation costs high, strongly favor vertical integration through plantation agriculture arrangements. The principal observed form in Mozambique is indeed plantation agriculture in the central and southern parts of the country. Historically, that has been the predominant arrangement. Some isolated cases of arrangements with independent medium to large scale private farmers were identified in the south. Also, a 'pilot project' for a CF scheme, funded by the South African Government was launched in fields adjacent to a sugar company in the southern province of Maputo. That was a coordinated effort between the sugar company, the Mozambican Government through the FFHA (Fundo de Fomento da Hidraulica Agricola) and a local farmer Association. The results were encouraging indicating that, under certain circumstances, CF schemes in this sub-sector are potentially beneficial for all participants.

Alternative Arrangements. No institutional arrangement is without problems, and most investors are constantly searching for ways to minimize problems and take better advantage of opportunities, in pursuit of increased profits. The analysis presented in Table 2 indicates that, while some of the problems that are identified with the existing primary arrangement may be eliminated with the alternative, many other problems are likely to emerge and the arrangements may or may not be desired on a poverty reduction standpoint. For each of the relevant crops, the analysis identifies the problems reported by

investors and those from the farmers' perspective under the current arrangements. Then, it examines the likely difficulties facing alternative arrangements under current conditions, the desirability of these arrangements from a poverty reduction viewpoint, and the prospects for success for the arrangement. Finally some key actions needed by government and private sectors for the success of those alternatives are discussed.

IMPLICATIONS FOR POVERTY REDUCTION:

Under ideal conditions - full set of efficient markets, including contingency markets, a well developed physical and communications infrastructure, highly educated populace and effective property rights enforcement - spot markets will be the best and most desirable organizational form. The reality, however, is that many of those conditions are not present in many countries, even among the more developed ones. In SSA, that is no exception and Mozambique is just a particular example. Therefore, the presence of factors that lead to high transaction costs in the relationship between firms and farmers, give rise to alternative institutional arrangements for managing transactions. Such arrangements include vertical coordination mechanisms that include a wide range of contract farming approaches, and fully vertically integrated plantation agriculture arrangements.

The final judgment about the impact of sub-sector specific arrangements on rural poverty of a given region is an empirical question. The study draws some preliminary implications for poverty reduction.

First, rural agro-industry can have direct and indirect effects on poverty. Direct effects come from wage employment of the rural poor in processing facilities, and from increased earnings to smallholders, who supply raw material to the processing firm. Indirect effects can be substantial, and come primarily from wage earners and smallholders re-spending their earnings in the rural economy. Much of this re-spending will be on items produced in the local non-farm economy, fueling its growth and increasing its contribution to poverty reduction.

Second, for either direct or indirect effects to be felt and sustained, the activities must be profitable for both the firm involved and also for rural residents.

Third, the relation between poverty alleviation and the institutional arrangements governing the relationship between farmers and agro-industrial firms is not linear and is likely to be commodity specific. However, two key facts can be referred to within the current context. On the one hand, due largely to information problems and to the failure of input and credit markets, spot markets are frequently unable to support high value crops in Mozambique. If smallholders are confined to low value crops, escaping poverty will be very difficult. On the other hand, plantation agriculture generates only one direct effect on poverty - wages - and tends to use capital intensive technologies. It will therefore almost always generate less poverty reduction than will reasonably successful CF schemes.

Fourth, one challenge for policy makers is, therefore, to find ways to make contract-based relationships successful in both efficiency and equity grounds, i.e., financially attractive to firms while profitable for a reasonable number of small farmers.

Finally, the characteristics of agro-industrialization with globalization, particularly more stringent quality and food safety standards, may make it difficult for small farmers and small agro-industrial firms to participate directly in the income growth that this process can unleash. The extent to which smaller farms and firms can participate directly, and the extent to which indirect effects are robust enough to generate substantial poverty reduction on their own, depends on many factors specific to the country and commodity in which the investment is taking place.

SUMMARY OF POLICY IMPLICATIONS: We draw some important implications for policy. First, many of the policies that will foster more direct participation of small farmers in the agro-industrialization process - and thus more poverty reduction - are steps that government should be supporting from any developmental perspective: improved roads and market information, improved rural education, removing legal barriers to the formation and development of producer associations, development in coordination with the private sector of workable grades and standards, and research on technology development and diffusion, especially improved seed varieties.

Second, beyond these general policy interventions, government needs to be sensitive to the details of proposed investment projects and practical about how to influence the type and location of investment to maximize poverty reduction effects. Whenever possible, favor labor intensive as opposed to capital intensive technologies, favor rural over urban locations for the processing plants, and favor crops which can be produced by the smallholder sector.

A good example in Mozambique is cashew processing, where labor intensive technologies located in production areas will have a greater impact on poverty reduction than will the more capital intensive technology located in urban areas.

Sugar cane is predominantly produced under PA in most of the world, due to specific characteristics of the crop. Yet contract farming schemes involving large numbers of small farmers have been successful complements to estate production in countries like Kenya and Swaziland. Where feasible, government should consider strategic actions to facilitate smallholder access to irrigable land near sugar processing plants, and should also consider financing needed extension assistance to these farmers. If done in collaboration with sugar companies, such actions would create win-win situations for companies and farmers.

Tea is another crop which, while most often produced in plantations, also has a track record of successful smallholder production under contract farming arrangements. In Mozambique, some of the value of investment in tea has occurred under contract farming arrangements. Whenever possible, these arrangements should continue to be favored over plantation investments.

Maize is entirely organized under Independent Producer arrangements, and is unlikely to support contract farming in the short- and medium-terms. Improved grades and standards, if developed in consultation with private investors, would be a key contribution facilitating continued investment and greater value added.

Cotton is produced almost entirely under contract farming arrangements between large companies and small farmers and has been very successful in stimulating rural income growth and poverty

reduction. Currently it faces serious problems in terms of the quality of assistance offered by companies. Government policy in this crop should focus on achieving a better balance between competition and coordination, in order to better safeguard the interests of farmers. Facilitation of the empowerment of farmer associations to reduce their dependency from cotton companies and increase their negotiating power to allow for increased direct benefits should be one key pillar in this effort.

The challenge is in balancing the costs and benefits of alternative policies and investments on efficiency and equity grounds, finding the right kind of incentives, and monitoring the effectiveness of the mechanisms expected to affect rural poverty. It would be very helpful to government, in the process of evaluating alternative investment proposals, if a simple method for predicting the investment's effects on poverty reduction could be developed.

FURTHER RESEARCH: Further research should be centered around a more in-depth and combined analysis between efficiency and equity of alternative forms, and considerations about the spill-over effects to effectively deal with the poverty reduction issue, and inform the government to address policy options. The process has to include three steps. First, the selection of specific sub-sectors and regions. Second, the development of a better understanding of the economics of alternative institutional arrangements in those sub-sectors and regions. Lastly, the use of regional impact analysis at the village level to: a) measure the direct and indirect income effects that result from alternative arrangements in selected sites dominated by particular sub-sectors; and b) identify and simulate alternative policy interventions, aimed at strengthening firm-smallholder relationships, to assess the likely direct and indirect effects on poverty.

Using both qualitative and quantitative methods, that research should, therefore, be able to answer in more precise terms three sets of questions in the context of selected sub-sectors and selected geographic areas:

1. What institutional arrangements between agro-industrial firms and rural smallholder producers may provide both efficient and equitable means of overcoming high transaction costs?

2. What conditions are necessary for those institutional arrangements to operate efficiently while promoting a socially desirable distribution of income?, and

3. What is the role of the government in helping those institutions - organizational forms - to succeed in achieving sustainable growth with equity?

The answers to this questions may help to address more effectively the practical details of policy making, including the design of incentive schemes to be provided by the Government to influence investors relationship with smallholder farmers. This research has to be capable of:

1. Feeding an analysis of the cost-effectiveness of the Government's choices when providing incentives to investors; and

2. Facilitating the development of analytical methods to evaluate an investment's potential poverty alleviation impacts including models capable of capturing the likely multiplier effects.

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Table 2. Reported Problems with Current and Alternative Choices and Key Private and Public Sector Actions

Current Arrangement				Suggested Alternative Arrangements				
Arrangement (Sub-Sector)	Key Factors Driving this Arrangement	Problems Reported by Investors	Problems from Farmers' Perspective	Alternative Arrangements	Adverse Factors in Implementing Suggested Alternatives	Desired from poverty reduction standpoint ?	Prospects for success?	Key government/private sector actions needed
Processing with Independent Producers (IP) (Maize)	Many consumers process the grain at home or in local hammer mills, creating highly dispersed domestic market for final sale. This makes CF highly problematical due to credit default.	+ Price uncertainty + Inconsistent quality + Insufficient raw materials/low processing capacity utilization + Competition with other domestic users including direct household consumption + High dispersion of sources of raw materials	+ Because of uncertainty in market opportunities, price volatility, lack of bargaining power in the market and lack of reliable storage facilities farmers find it difficult to balance between food security and the profit motive.	Processing with Contract Farming (CF)	+ Returns to farmers may be lower than the opportunity cost of labor + Default due to many potential buyers + Problems of contract enforcement due to weak legal system + Low economies of scale if farmers are not organized in groups	Yes	Poor at the present time	A company successful in emphasizing quality and paying a premium for that quality could potentially make a CF scheme work. Improved public G&S would help. Quality protein maize (QPM) may improve prospects for success by supporting higher price, but there will be informational problems at the consumer and possibly processor levels, requiring effective government regulation, which is not likely to be forthcoming in near term.
Processing with Independent Producers (IP) (Cashew)	The available export market for unprocessed nuts gives rise to many potential buyers that the local processors have to compete with. This renders CF schemes difficult to implement because of the high risk of default. Also, current firms may not have a comparative advantage in the intensive management needed for successful CF scheme.	+ Price competition with exporters; + Inconsistent quality; + Lack of raw materials/low processing capacity use; + Lack of cash flow; + High dispersion of sources; + Missing input/factor markets.	+ Lack of access to inputs for PMD control reduces productivity and returns to labor; + Lack of negotiating power and price uncertainty makes it an unreliable source of income.	Processing with Contract Farming (CF)	+ Returns to farmers may be lower than the opportunity cost of labor; + Default due to price competition with exporters given the weak legal system to ensure contract enforcement; + High cost of extension and input delivery if farmers are not organized in groups; + Cost of procurement of new varieties and inputs; + Current firms may not have a comparative advantage in the intensive management needed for successful CF scheme.	Yes	Poor at the present time	+ For an effective CF scheme in cashew, firms need to be committed to an intensive management approach; + Firms need to be effectively engaged in promoting new plantings and control PMD; + Adopt decentralized smaller scale technologies that are scalable to farm level production capacity; + Continuing GOM support to research in PMD control and new varieties and extension; and + Effective GOM regulatory role to reduce risk of default.
				Processing with Plantation Agriculture (PA)	+ Problems with access to land with security of tenure close to processing unit; + Lack of excess farm labor for selected tasks; + High direct labor and supervision costs; + High risks associated with direct crop production.	No	N/A	N/A

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Arrangement (Sub-Sector)	Key Factors Driving this Arrangement	Problems Reported by Investors	Problems from Farmers' Perspective	Alternative Arrangements	Adverse Factors in Implementing Suggested Alternatives	Desired from poverty reduction standpoint ?	Prospects for success?	Key government/private sector actions needed
Processing with Contract Farming (CF) (Cotton)	Credit and input market failure in combination with input needs of the crop create need for CF or PA arrangement. Labor intensity and lack of economies of scale in production preclude PA, while need for processing prior to final sale (resulting in limited number of buyers) makes CF feasible.	+ Default due to price competition among cotton companies + Default due to weak legal system + Lack of farmer incentives due to firm monopsony power + Information asymmetry and opportunistic behavior	+ High dependence on the cotton companies for input supply and lack of negotiating power leads to uncertainty regarding expected income from cotton production.	Processing with Plantation Agriculture (PA)	+ Difficult expansion to area cultivated close to processing unit + High direct labor costs, due to labor intensive nature of production + High labor supervision costs + High risks associated with direct crop production	No	N/A	N/A
				Processing with Independent Producers (IP)	+ Missing input/factor markets + High marketing costs + Poor market information and physical infra-structure + Inconsistent product quality + Price uncertainty	No	N/A	N/A
Processing with Plantation Agriculture (PA) (Sugar)	Economies of scale in production make PA feasible, while low value/weight ratio makes PA advantageous as way to reduce transport costs.	+ Low processing capacity utilization/insufficient raw materials + Difficult expansion of area cultivated close to the fixed investments in irrigation + High capital costs in expanding production areas + High costs in production supervision + High risk associated with crop production	+ Relatively low employment generation due to the capital intensive nature of the production limits the direct impact on rural incomes that is limited to farm workers' wage.	Processing with Contract Farming (CF)	+ High specificity in production techniques that require high costs in extension + High costs with investments in irrigation	Yes	Possible	+ Success of CF in this sub-sector only possible if there is an effective partnership between GOM and the company in sharing the costs associated with increased smallholder participation. The company needs to make basic investment in irrigation (incentives to the company given by GOM if needed). It is in the companies interest to reduce extension costs and the GOM may participate with the provision of those services and in helping organizing farmers for an effective and well rewarded participation.